Exhibit 4

(19) Japan Patent Office (JP)
(11) Unexamined Patent Application Publication
(12) Japanese Unexamined Patent Application Publication (A) S62-60378

(51) Int. Cl.^{4} Identification symbols Internal file number (43) Published 17 March 1987

(51) Int. Cl.^{4}	Identification symbols	Internal file number
H04N 7/00		6668–5C
5/44		7423–5C
7/173		6668–5C

Request for examination: Not filed Number of inventions: 3 (14 pages total)

(54) Title of invention Television receiver

(21) Japan Patent Application S60-200034
(22) Filed 10 September 1985

(72) Inventor	Nakazawa, Eiji	c/o Casio Computer Co., Ltd. Hamura Technical Center, 3-2-1 Sakae-cho, Hamura-machi, Nishi Tama-gun, Tokyo
(72) Inventor	Tsukamoto, Akihiro	c/o Casio Computer Co., Ltd. Hamura Technical Center, 3-2-1 Sakae-cho, Hamura-machi, Nishi Tama-gun, Tokyo
(71) Applicant	Casio Computer Co., Ltd.	2-6-1 Nishi Shinjuku, Shinjuku-ku, Tokyo
(74) Agent	Patent Attorney Suzue, Takehiko	and 2 others

A portion of Figure 3 of the drawings has not been published, as provided under Article 65, Section 2, Paragraph 4 of the Patent Law.

Specifications

1. Title of the Invention

Television receiver

2. Scope of Patent Claims

(1) A television receiver distinguished in that it comprises:

a program information storage means that stores television program information including broadcast station data, broadcast date and time data and program title data and

a means that displays television program information stored by said program information storage means.

(2) A television receiver distinguished in that it comprises:

a program information storage means that stores television program information including broadcast station data, broadcast date and time data and program title data;

a clock circuit;

a means that detects programs currently being broadcast based on the date and time data timed by the clock circuit and program broadcast date and time data stored by said program information storage means; and

a means that displays a list of programs currently being broadcast detected by the above means.

(3) A television receiver distinguished in that it comprises:

a program information storage means that stores television program information including at least one of the following: broadcast station data, broadcast date and time data, program type data, broadcast day of the week data, and program title data;

a means that designates at least one of the following items: broadcast station, date and time, program type, and day of the week;

a means that searches program information for the items designated by the above means from said program information storage means; and

a means that displays program information searched for by the above means.

(4) A television receiver as set forth in claim 3, distinguished in that said searching means excludes programs that have already concluded from its search.

3. Detailed Description of the Invention

{Technical Field of the Invention}

The present invention relates to television receivers comprising a function of displaying television program information.

{Prior Art and Problems Thereof}

Currently, television receivers have spread to practically all households, and the viewership rate is also extremely high. Furthermore, in every household equipped with a television receiver, it is often the case that somebody wants to see the news, or somebody wants to see the weather forecast. Moreover, there are cases when somebody wants to watch a film or to watch baseball. In such cases where somebody wants to view a specific program, it suffices to look at the television section of a newspaper and tune in, but sometimes there is may be no newspaper at hand, or looking at the newspaper may be bothersome. This is notable when going out somewhere with a portable television.

{Object of the Invention}

The present invention was made in view of the aforesaid points, and has the objective of providing a television receiver that allows a program list to be easily displayed on the television screen and allows searching for desired programs from that program list.

{Gist of the Invention}

The present invention provides a program information storage means that stores television program information including broadcast station data, broadcast date and time data, program title data, etc.

{Examples of Embodiment of the Invention}

Below, an example of embodiment of the present invention is described with reference to the drawings. This example of embodiment shows a case using character and pattern information system (videotex) telesoftware, whereby television program information is stored in program memory, and the television program information stored in this program memory is displayed on the CRT screen in response to specific key operations. First, the appearance and structure of the television receiver is described using Figure 2. In Figure 2, 1 is the television receiver housing. A television receiver circuit and character graphical information system (videotex) reception circuit, the details of which are described later, are arranged in this housing 1. Furthermore, the top front side of said housing 1 is formed diagonally, with a keyboard 2 being provided in that area. Moreover, a CRT display unit 3 is arranged in the top part of the housing 1, with a telephone placement area 4 being formed to the side thereof. A telephone 5 is placed onto this telephone placement area 4.

Next, the structure of the television reception circuit 10 and the character and pattern information system reception circuit 20, the details of which are shown in Figure 1, is described. In Figure 1, 12 is the tuner of the television reception circuit 10, which selects the broadcast radio wave of the desired channel according to the instructions of the auto channel circuit 13 from the television broadcast radio waves induced in the antenna 11, converts it to an intermediate frequency and outputs it to the TV circuit 14. This TV circuit 14 amplifies the television signal sent from the tuner 12, then performs processing for video detection, sync separation, audio detection, etc., outputs the video signal via a display switching circuit 15 to a CRT display unit 3 and outputs the audio signal to the speakers (not illustrated). Moreover, said TV circuit 14 generates a tuning signal based on the signal from the tuner 12 and outputs it to said auto channel circuit 13. Furthermore, 16 is a program memory that stores television program information, to which program memory 16 are connected a search circuit 17 and flag control circuit 18. Moreover, 19 is a clock circuit that counts the date and time and outputs the current date and time data to the search circuit 17 and the flag control circuit 18. This flag control circuit 18 performs rewriting control of flags, such as an on-air or program-complete flag, in the program memory 16 in response to time data from the clock circuit 19. Said search circuit 17 searches the content of program memory 16 in accordance with instruction from the keyboard 2 in the character and pattern information system reception circuit 20, and outputs channel selection signals to the auto channel circuit 13.

Said program memory 16 stores for instance one month's worth of program information; the address area is divided into date units, each given a top address (x address). Figure 3 shows the structure of a partial area (May 12) of the program memory 16, wherein the date, channel, day of the week, start time, end time, the program type, a flag F1 indicating that the program is being broadcast, a flag F2 indicating that the program has completed, the program title, etc. are set as the program information. This program information is read out by telesoftware from the videotex information center and written in via the character and pattern information system reception circuit 20.

The character and pattern information system reception circuit 20 also has a telephone line (not illustrated) connected to a line control unit 21 via a terminal unit 22. Furthermore, the line control unit 21 has a telephone 5 connected thereto and has a videotex controller 25 connected thereto via a modem 23 and a modem controller 24. In addition, said videotex controller 25 has a keyboard 2, display memory 26 and work memory 27 connected thereto, and has a printer 29 connected thereto via printing memory 28. Said display memory 26 is memory that stores received videotex images, and this stored data is sent via a display switching circuit 15 to a CRT display unit 3. Furthermore, when said videotex controller 25 reads television program information from the videotex information center using telesoftware in accordance with instructions from the keyboard 2, that television program information is output to the television reception circuit 10 and is stored in program memory 16. Moreover, when the program type is specified by the keyboard 2, the videotex controller 25 outputs the corresponding type code and search command to the search circuit 17.

Next, the details of the search circuit 17 in aforementioned Figure 1 are described by means of Figure 4. In Figure 4, 171 is an address generating circuit; this address generating circuit 171 is given date data from the clock circuit 19 in Figure 1 and is given program search commands from the keyboard 2 via the videotex controller 25. Said address-generating circuit 171 operates in accordance with search commands from the keyboard 2, generating address data x corresponding to the date data provided from the clock circuit 19 and placing it into an address register 172. The address data x placed into the address register 172 designates the top address of a date area of the program memory 16 shown in Figure 1. According to said designated address, the information for one program, i.e. the "date", "channel", "day of the week", "start time", "end time", "type", "flag F1", "flag F2" and "program title" are read out and written into a buffer 173. Then, out of the information written into said buffer 173, the "channel" information is input into a channel voltage generating circuit 174, the "type" information that indicates the type of program is input into a type code comparison circuit 175, and the "flag F1" is input into a flag discrimination circuit 176. This flag discrimination circuit 176 discriminates whether the flag F1 read out into the buffer 173 is "1" or "0", outputting a "+1" signal to the address register 172 via an OR circuit 177 if it is "0" and outputting a compare command to the type code comparison circuit 175 if it is "1". Furthermore, this type code comparison circuit 175 is given, via a type code register 178, the code indicating the type of program that was input via the videotex controller 25 from the keyboard 2. When given a "1" signal from the flag discrimination circuit 176, said type code comparison circuit 175 compares the type code read from the buffer 173 with the type code input into the type code register 178, outputting a match signal to the channel voltage generating circuit 174 if they match, and outputting a no-match signal to the address register 172 via the OR circuit 177 if they do not match. When given a no-match signal from the type code comparison circuit 175, said channel voltage generating circuit 174 generates a channel voltage corresponding to the channel information provided from the buffer 173, and outputs it to the auto channel circuit 13 of Figure 1.

Next, the operation of the above example of embodiment is described. Prior to any television program search operation, as shown in the flow chart of Figure 5, for instance one month's worth of television program information is read from the videotex information center by means of telesoftware and is stored in the program memory 16 of the television reception circuit 10. That is, the user first selects the videotex mode by key operations from the keyboard 2, as shown in step A1 of Figure 5. He then calls the videotex information center using the telephone 5 and receives for instance one month's worth of television program information including broadcast station data, broadcast time data and program type data by means of telesoftware, as shown in step A2. In said videotex mode, the display switching circuit 15 is switched over to the display memory 26 side, and the received videotex images stored in display memory 26 are displayed on the CRT display unit 3. As television program information is being sent from the information center via telesoftware, the videotex controller 25 stores that television program information in program memory 16 in step A3. Subsequently, the videotex controller 25 sends a command to the search circuit 17, causing in step A4 the execution of initial processing, the details of which are shown in Figure 6, and completing program information reception processing.

Next, the details of the initial processing of staid step A4 are described with the aid of Figure 6. The search circuit 17 first takes "1" (the top address) as the designated address N of program memory 16, as shown in step A11 of Figure 6, and then reads the content of the designated address from the program memory 16 in step A2. Then, as shown under step A13, it compares the program date read from program memory 16 to the current date as timed by the clock circuit 19, and if the current date is greater, i.e. if the broadcast date was yesterday or earlier and the broadcast has already been completed, it proceeds to step A14, sets the flag F2 and then proceeds to step A16. Furthermore, if the current date and the program date match, it proceeds from step A13 to step A15, determines if the current time as timed by the clock circuit 19 is past the end time of the program, and if the current time is past the program end time, it proceeds to step A14 and sets the flag F2. However, if the current time is not past the program end time, it proceeds from step A15 to step A16. Furthermore, in aforementioned step A13, if the current date is smaller than the program date, i.e. if it is determined that the program has not been broadcast yet, it proceeds directly to step A16. In this step A16, it evaluates whether the designated address N of program memory 16 has reached the final address, and if the final address has not been reached, the designated address N is incremented by "+1" in step A, and the system returns to step A12. Thereafter, the same processing is repeated, successively reading program information from the program memory 16, determining if that program's broadcast has ended, and setting the flag F2 for programs whereof the broadcast has ended. Then, once the designated address N of program memory 16 reaches the final address, that state is detected in step A16 and initial processing is terminated. Here, the final address N may be fixed, or else initial processing may be terminated upon reading a termination code from the program memory 16.

After television program information has been stored in program memory 16 and initial processing has been completed as described above, it is possible to have the search performed automatically by designating arbitrary program types by key operations using the keyboard 2. When having a search performed for a television program, one switches to TV mode by means of key operations using the keyboard 2 as shown in step B1 of Figure 7, and operates the program keys. When switched to TV mode, the videotex controller 25 constantly checks for the presence of program key operations as shown in step B2; when the program keys are not being operated, it enters a state of waiting for input of other keys and enters normal TV reception mode whereby video signals outputted from the TV circuit 14 are displayed on the CRT display unit 3. However, when a program key is operated, the videotex controller 25 goes from step B2 to step B3 and displays a program menu on the CRT display unit 3. That is, it displays a program menu of "News", "Weather forecast", "Baseball", "Sports", "Films", "Educational", "Drama", "Songs", "Cartoons", "Quizzes", "Tabloid" (tabloid programs), "Sketches", etc. together with the corresponding numbers, on the CRT display unit 3, as shown in Figure 8. The user, as shown under step B4, specifies the number corresponding to the desired program from the program menu displayed on the CRT display unit 3 by operating keys of the keyboard 2. Once the program designation number is input, the videotex controller 25, as shown in step B5, outputs the designation number's type code and a search command to the search circuit 17, after which it holds its state in step B6 until the search is completed. Then, once the search operation of the search circuit 17 has completed and the designated station is selected, the videotex controller 25 assumes a state of waiting for other key input and enters normal TV reception mode, and the program of the station selected by said search circuit 17 is displayed on the CRT display unit 3.

Next, the detailed operation of said search circuit 17 and flag control circuit 18 is described. In Figure 1, the program memory 16, search circuit 17, flag control circuit 18 and clock circuit 19 are constantly supplied with operating voltage regardless of whether the power supply is on or off. The clock circuit 19 constantly performs timing processing of the current time and date, and provides current time and date information to the search circuit 17 and flag control circuit 18. Said flag control circuit 18 performs rewriting control of the program information flags F1 and F2 stored in program memory 16 based on the time information from the clock circuit 19. Figure 9 shows a flow chart of the rewriting processing of said flags F1 and F2; below, the operation is described according to this flow chart. The flag control circuit 18, as shown in step C1 of Figure 9, performs detection processing of one-minute pulses sent from the clock circuit 19; upon detecting a one-minute pulse, it proceeds to step C2 and reads date data from the clock circuit 19. Then, the flag control circuit 18, as shown in step C3, generates the top address x and the end address x_{END} for the date area of program memory 16 corresponding to the date data read from the clock circuit 19. Then, as shown in step C4, the flag control circuit 18 sets the designated address N of program memory 16 to the top address x, and reads out the stored content of program memory 16 in step C5. Then in step C6, it determines whether or not flag F2 has been set, and if flag F2 has not been set, it proceeds to step C7 and determines if the current time is past the broadcast start time. If the current time is past the broadcast start time, it proceeds to step C8 and determines if the current time has reached the broadcast end time, and if the current time has not reached the broadcast end time, i.e. if the broadcast is currently going on, it sets flag F1 in step C9. However, if the current time has reached the broadcast end time, it moves from step C8 to step C10, sets flag F2, and resets flag F1. Then, if the processing of aforementioned step C9 or step C10 has been completed, or if it is determined that flag F2 has been set (broadcast has ended) in aforementioned step C6, if it is furthermore determined that the current time has not reached the broadcast start time in step C7, one proceeds to step C11, determines if the memory designation address N has reached the final address, and if the final address has not been reached yet, one increments the memory designation address N by "+1" in step C12 and returns to step C5. Subsequently, the same operation is repeated, setting flag F1 if the program is being broadcast, and setting flag F2 if the broadcast has ended. Then, once processing of the current date's date area of program memory 16 is completed, the decision at step C11 becomes YES, whereupon the system returns to step C1 and waits until the next one-minute pulse is sent from the clock circuit 19. The rewriting control of flags F1 and F2 is performed every time a one-minute pulse is outputted from the clock circuit 19 in the manner described above.

Rewriting of flags F1 and F2 of program memory 16 is constantly performed by the flag control circuit 18 as described above, and when a program type is designated by operating keys of the keyboard 2 as described above and the videotex controller 25 outputs a type code and search command to the search circuit 17 in step B5 of Figure 7, program search processing is started by the search circuit 17. That is, the type code sent from said videotex controller 25 to the search circuit 17 is placed into type code register 178 and the search command is inputted into the address generating circuit 171. This address generating circuit 171, when given said search command, generates the top address x for the date area of program memory 16 corresponding to the date information from the clock circuit 19 and places it into address register 172. The top address x of the date area of program memory 16 is designated by means of the data placed in this address register 172, and one program's worth of information at that designated address is read from the program memory 16 into buffer 173. When program information is read into this buffer 173, first, flag F1 is sent to the flag discrimination circuit 176 and its content is evaluated. If the program read out into buffer 173 is not being broadcast, flag F1 will be "0", so in this case a "+1" signal will be output from the flag discrimination circuit 176 via the OR circuit 177 and the content of address register 172 will be incremented by "+1". The next address of program memory 16 is thereby designated, and the program information stored at that address is read into buffer 173. Then the content of flag F1 is evaluated by the flag discrimination circuit 176 in the same way as in the above case. If Flag F1 is "0", the same operation as above is repeated, while if flag F1 is "1", i.e. if the program is being broadcast, a "1" signal is sent from the search circuit 17 to the type code comparison circuit 175. When given a "1" signal from the flag discrimination circuit 176, this type code comparison circuit 175 compares the type code held at the time in buffer 173 to the type code held in the type code register 178, and if there is no match, i.e. if the program read into the buffer 173 is not the program designated by means of the keyboard 2, a no-match signal is output to the address register 172 via the OR circuit 177. As a result, the content of address register 172 is incremented by "+1" and the next address of program memory 16 is designated and its content read out into the buffer 173. When program information is newly placed into this buffer 173, the flag F1 and type code are checked as described above. If the type code held in the buffer 173 and the type code held in type code register 178 match, a match signal is sent from the type code comparison circuit 175 to the channel voltage generating circuit 174. That is, if for example "news" was specified as the program type using the keyboard 2, when a "news" program currently being broadcast is read out from the program memory 16 into the buffer 173, a match signal will be output from the type code comparison circuit 175 and sent to the channel voltage generating circuit 174. When this channel voltage generating circuit 174 is given said type code match signal, it generates voltage corresponding to the channel code held in the buffer 173 and outputs it to the auto channel circuit 13. When given a channel voltage from the channel voltage generating circuit 174, this auto channel circuit 13 controls the reception frequency of the tuner 12 according to this channel voltage and selects the station of the designated channel. When the program type is designated using the keyboard 2 as described above, the channel on which it is being broadcast is selected and the program is displayed on the CRT display unit 3. When there is no station broadcasting the specified type of program, e.g. "news", the station that was selected at the time continues to be received. Furthermore, if two or more stations are broadcasting the specified type of program, the lower numbered station is received.

Next, the operation when displaying the program list stored in program memory 16 on the CRT display unit 3 is described. The display of said program list is specified by operating keys of the keyboard 2. For the program list to be displayed, as shown in Figure 10, one can specify:

① A list of all future programs to be broadcast.
② A list of programs for one designated date.
③ A summary list of programs of a specified genre (type) to be broadcast in the future.
④ A summary list of programs of a specified channel to be broadcast in the future.
⑤ A list of programs for a designated (upcoming) day of the week.
⑥ A list of programs currently being broadcast.

To display the program lists of ① though ⑥ above, for example as shown in Figure 10, ① is designated by a simple operation D using the "program list" key alone; ② is designated by a combined operation E involving input of the "date" and using the "program list" key; ③ is designated by a combined operation F involving designation of the program "type" and using the "program list" key; ④ is designated by combined operation G involving designation of the "channel" and using the "program list" key; ⑤ is designated by combined operation H involving designation of the "day of the week" and using the "program list" key; and ⑥ is designated by a simple operation I using the "on air" key. When the above-described program list display designation operation is performed using the keyboard 2, the videotex controller 25 executes the processing shown in Figures 11 through 16.

Figure 11 shows the processing of the videotex controller 25 when displaying a list of all programs to be broadcast in the future as per ① above. When the key operation D for ① above is performed, the videotex controller 25 first sets the designated address N of program memory 16 to "1" (the top address), as shown in step D1, and reads the content of program memory 16 in step D2. Next, as shown in step D3, it evaluates whether today's date matches the program date, and if they match, it further evaluates in step D4 whether or not the current time has reached the program end time. Then, if the broadcast of the program read from program memory 16 has not ended yet, the program information is outputted into the work memory 27 as shown in step D5, after which one proceeds to step D6. Furthermore, if in aforementioned step D3 it is determined that the dates do not match, or if it is determined in step D4 that the program's broadcast has ended, one likewise proceeds to step D6. At this step D6, it is evaluated if the designated address N of program memory 16 has reached the final address, and if the final address has not been reached, the designated address N is updated in step D7 and one returns to step D2. Subsequently, the same processing operation is repeated, with only the information for programs to be broadcast in the future being selected from the program information stored in program memory 16 and written into the work memory 27. Then, if it is determined in step D6 that the designated address of program memory 16 has reached the final address, one proceeds to step D8, where the program information stored in the work memory 27 is edited into an easy to view form. Thereafter, as shown in step D9, the aforementioned edited program information is written from the work memory 27 into the display memory 26, and is further sent from this display memory 26 to the CRT display unit 3 and displayed. That is, a list of all programs to be broadcast in the future is displayed on the CRT display unit 3.

Next, the operation under ② above, when combined operation E involving "date" input and the "program list" key is performed to display a list of programs for one day, is described using Figure 12. When the key operation E for ② above is performed using the keyboard 2, the videotex controller 25 first generates the top address x for the date area of the given day as the designated address N of program memory 16, as shown in step E1 of Figure 12, and reads the content of the program memory 16 in step E2. Then, as shown in step E3, it outputs the program information into the work memory 27, after which it moves to step E4 and evaluates if the designated address N of the program memory 16 has reached the final address of the date area, and if the final address has not been reached, it updates the designated address N in step E5 and returns to step E2. Subsequently, the same operation is repeated, selecting only information for programs to be broadcast on the designated date out of the program information stored in the program memory 16, and writing it into the work memory 27. Then, upon determining in step E4 that the designated address N of the program memory 16 has reached the final address of the date area, it moves to step E6 where the program information stored in the work memory 27 is edited into an easy to view form. Then, as shown in step E7, said edited program information is written from the work memory 27 into the display memory 26, and is further sent from this work memory 27 to the CRT display unit 3 and displayed. That is, a list of one day's worth of programs for the designated day is displayed on the CRT display unit 3.

Next, the operation under ③ above, when combined operation F involving "type" designation and using the "program list" key is performed to display a summary list of programs of the given genre to be broadcast in the future, is described using Figure 13. When the key operation F for ③ above is performed using the keyboard 2, the videotex controller 25 first sets the designated address N of program memory 16 to 1 (the top address) as shown in step F1 of Figure 13, and reads the content of program memory 16 in step F2. Then, as shown in step F3, it determines if flag F2 is "1" or "0", i.e. if the program's broadcast has ended or not, and if the broadcast has not ended, it further evaluates in step F4 if that program's type code matches the designated type code. Then, if the program's type code and the designated type code match, it outputs the program information into the work memory 27 as shown in step F5, and then moves to step F6. Moreover, it if it determined in aforementioned step F3 that the program's broadcast has already ended, or if it is determined in step F4 that the type codes do not match, it likewise moves to step F6. In this step F6, it is evaluated if the designated address N of program memory 16 has reached the final address, and if the final address has not been reached, the designated address N is updated in step F7 and one returns to step F2. Subsequently, the same processing operation is repeated, with only the information for programs of the designated type being selected from the program information stored in program memory 16 and written into the work memory 27. Then, if it is determined in step F6 that the designated address of program memory 16 has reached the final address, one proceeds to step F8, where the program information stored in the work memory 27 is edited into an easy to view form. Thereafter, as shown in step F9, the aforementioned edited program information is written from the work memory 27 into the display memory 26, and is further sent from this display memory 26 to the CRT display unit 3 and displayed. That is, a summary list of programs of the designated genre to be broadcast in the future is displayed on the CRT display unit 3.

Next, the operation under ④ above, when combined operation G involving "channel" designation and the "program list" key is performed to display a summary list of programs to be broadcast in the future on the given channel, is described using Figure 14. When the key operation G for ④ above is performed using the keyboard 2, the videotex controller 25 first sets the designated address N of program memory 16 to 1 (the top address) as shown in step G1 of Figure 14, and reads the content of program memory 16 in step G2. Then, as shown in step G3, it determines if flag F2 is "1" or "0", i.e. if the program's broadcast has ended or not, and if the broadcast has not ended, it further evaluates in step G4 if that program's channel matches the designated channel. Then, if the program's channel and the designated channel match, it outputs the program information into the work memory 27 as shown in step G5, and then moves to step G6. Moreover, it if it determined in aforementioned step G3 that the program's broadcast has already ended, or if it is determined in step G4 that the channels do not match, it likewise moves to step G6. In this step G6, it is evaluated if the designated address N of program memory 16 has reached the final address, and if the final address has not been reached, the designated address N is updated in step G7 [*sic*] is repeated, with only the information for programs to be broadcast in the future on the designated channel being selected from the program information stored in program memory 16 and written into the work memory 27. Then, if it is determined in step G6 that the designated address of program memory 16 has reached the final address, one proceeds to step G8, where the program information stored in the work memory 27 is edited into an easy to view form. Thereafter, as shown in step G9, the aforementioned edited program information is written from the work memory 27 into the display memory 26, and is further sent from this display memory 26 to the CRT display unit 3 and displayed. That is, a summary list of programs to be broadcast in the future on the designated channel is displayed on the CRT display unit 3.

Next, the operation under ⑤ above, when combined operation H involving "day of the week" designation and the "program list" key is performed to display a list of one day's worth of programs for an upcoming designated day of the week, is described using Figure 15. When the key operation H for ⑤ above is performed using the keyboard 2, the videotex controller 25 first evaluates if the current day of the week matches the designated day of the week as shown in step H1 of Figure 15, and if they match, it proceeds to step H2, generating the top address x for the date area of program memory 16 of the given date, and reads the content of the program memory 16 in step H3. Then after outputting the program information into the work memory 27 as shown in step H4, it proceeds to step H5, determines if the designated address N of program memory 16 has reached the final address of the date area, and if the final address has not been reached, the designated address N is updated in step H6 and one returns to step H3. Subsequently, the same processing operation is repeated, with only the information for programs to be broadcast on the designated day of the week, which in this case is the current day, being selected from the program information stored in program memory 16 and written into the work memory 27. Then, if it is determined in step H5 that the designated address N of program memory 16 has reached the final address of the date area, one proceeds to step H7, where the program information stored in the work memory 27 is edited into an easy to view form. Thereafter, as shown in step H8, the aforementioned edited program information is written from the work memory 27 into the display memory 26, and is further sent from this display memory 26 to the CRT display unit 3 and displayed. That is, a list of one day's worth of programs for the designated day of the week is displayed on the CRT display unit 3.

Moreover, if it is determined in aforementioned step H1 that the current day of the week and the designated day of the week are different, one proceeds to step H9, where the date of the upcoming day of the week in question is calculated, and then a top address x' for that date is generated in step H10 as the designated address N of program memory 16. Thereafter, the same processing as in steps H3 through H6 above is repeated through steps H11 to H14. Then in step H13, once it is determined that the designated address has reached the final address x'_{END}, one proceeds to aforementioned step H7, where editing processing is performed, after which the information is output to the display memory 26 as shown in step H8 and displayed on the CRT display unit 3.

Next, the operation under ⑥ above, when key operation I using the "on air" key is performed to display a list of programs currently being broadcast, is described using Figure 16. When the key operation I for ⑥ above is performed using the keyboard 2, the videotex controller 25 first generates the top address x for the date area of the given day as the designated address N of program memory 16, as shown in step I1 of Figure 16, and reads the content of the program memory 16 in step I2. Then, as shown in step I3, it determines if flag F1 is "1" or "0", i.e. if the program is currently being broadcast, and if the broadcast is currently on the air, the information for that program is output into the work memory 27 as shown in step I4, after which one proceeds to step I5. Moreover, if it is determined in step I3 that the program is not currently on the air, one proceeds directly to step I5 without performing the processing of step I4. In this step I5, it is evaluated if the designated address N of program memory 16 has reached the final address, and if the final address has not been reached, the designated address N is updated in step I6, and one returns to step I2. Subsequently, the same processing operations are repeated, with only the information for programs currently on the air being selected from the program information stored in program memory 16 and written into the work memory 27. Then, if it is determined in step I5 that the designated address of program memory 16 has reached the final address of the date area for the given day, one proceeds to step I7, where the program information stored in the work memory 27 is edited into an easy to view form. Thereafter, as shown in step I8, the aforementioned edited program information is written from the work memory 27 into the display memory 26, and is further sent from this display memory 26 to the CRT display unit 3 and displayed. That is, a summary list of programs currently being broadcast is displayed on the CRT display unit 3.

In the above example of embodiment, if the program list cannot be displayed completely on a single screen, one can allow scrolling, or display one day's worth or one channel's worth at a time and move to the next page by operating a specified key such as the return key.

Furthermore, in the above example of embodiment, by including performer information in the program information stored in the program memory 16, it is also possible to display a summary list of programs with a designated performer.

{Effect of the Invention}

According to the present invention as described in detail above, a program information storage means is provided that stores television program information including broadcast station data, broadcast date and time data, program title data, etc., and the television program information stored by this means is selected and read out to the display screen in response to specific input operations, thereby making it possible to simply display arbitrary program lists on the television screen, for instance lists of all programs to be broadcast in the future, programs on a designated date, programs of a designated type, programs of a designated day of the week, programs of a designated channel, programs currently on the air, etc., which is very convenient in cases where there is no newspaper at hand and the like.

4. Brief Description of the Drawings

The drawings show an example of embodiment of the present invention. Figure 1 is a block diagram showing a circuit configuration. Figure 2 is a perspective view of the external configuration. Figure 3 is a drawing that shows an example of information stored in program memory. Figure 4 is a block diagram showing the details of the search circuit in Figure 1. Figure 5 is flow chart showing the operation of receiving program information. Figure 6 is a flow chart showing the details of the initial processing in Figure 5. Figure 7 is a flow chart showing the program search operation. Figure 8 is a drawing that shows a program menu display example. Figure 9 is a flow chart showing the flag rewriting processing for the program memory. Figure 10 is a drawing that shows an example of key operations for specifying and displaying various types of program lists. Figure 11 is a flow chart showing the processing operations for displaying a list of all programs to be broadcast in the future. Figure 12 is a flow chart showing the processing operations for displaying a list of programs for a specified date. Figure 13 is a flow chart showing the processing operations for displaying a summary list of programs of a specified type. Figure 14 is a flow chart showing the processing operations for displaying a list of programs of a specified channel. Figure 15 is a flow chart showing the processing operations for displaying a list of programs for a specified day of the week. Figure 16 is a flow chart showing the processing operations for displaying a list of programs currently on the air.

1 ··· television receiver housing, 2 ··· keyboard, 3 ··· CRT display unit, 4 ··· telephone placement area, 5 ··· telephone, 10 ··· television reception circuit, 11 ··· antenna, 12 ··· tuner, 13 ··· auto channel circuit, 14 ··· TV circuit, 15 ··· display switching circuit, 16 ··· program memory, 17 ··· search circuit, 18 ··· flag control circuit, 19 ··· clock circuit, 20 ··· character and pattern information system reception circuit, 21 ··· line control unit, 23 ··· modem, 24 ··· modem controller, 25 ··· videotex controller, 26 ··· display memory.

Agent for the applicant: Patent Attorney Suzue, Takehiko

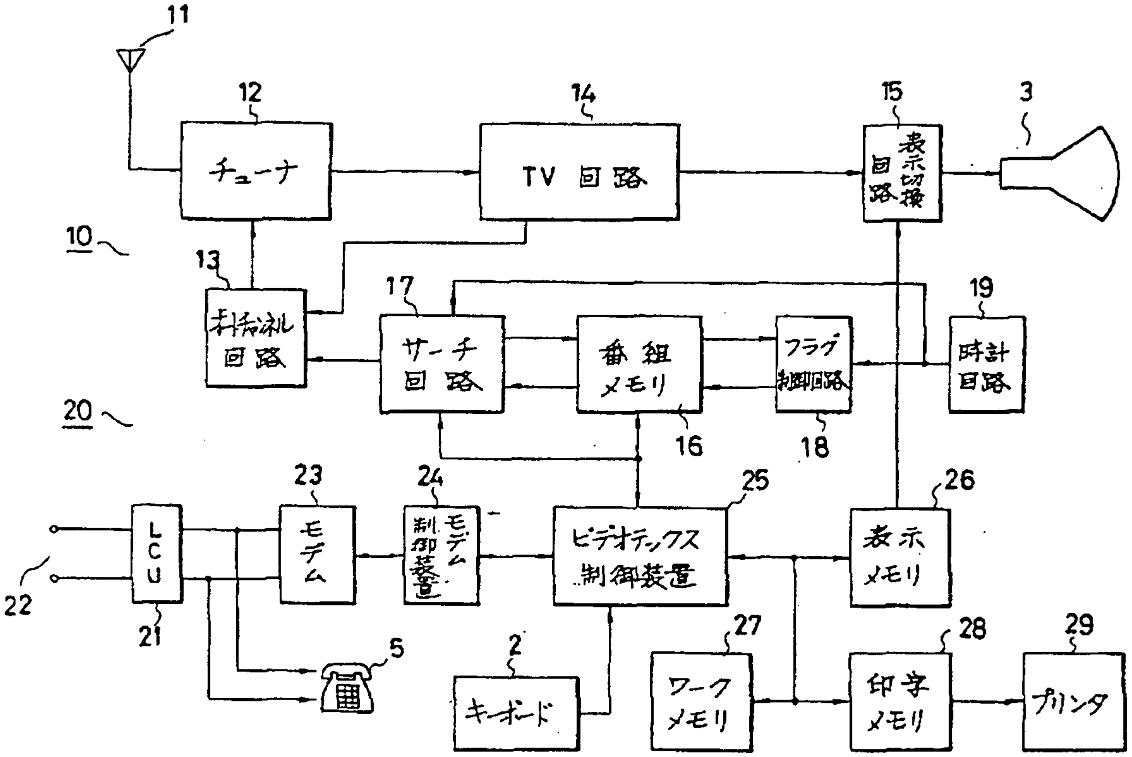
11
12
14
15
3
チューナ
TV 回路
表示切換回路
10
13
オートチャネル回路
17
サーチ回路
番組メモリ
フラグ制御回路
19
時計回路
20
16
18
23
24
25
26
LCU
モデム
モデム制御装置
ビデオテックス制御装置
表示メモリ
22
21
5
2
27
28
29
キーボード
ワークメモリ
印字メモリ
プリンタ

Figure 1

[captions]
2: Keyboard
12: Tuner
13: Auto channel circuit
14: TV circuit
15: Display switching circuit
16: Program memory
17: Search circuit
18: Flag control circuit
19: Clock circuit
23: Modem
24: Model controller
25: Videotex controller
26: Display memory
27: Work memory
28: Printing memory
29: Printer

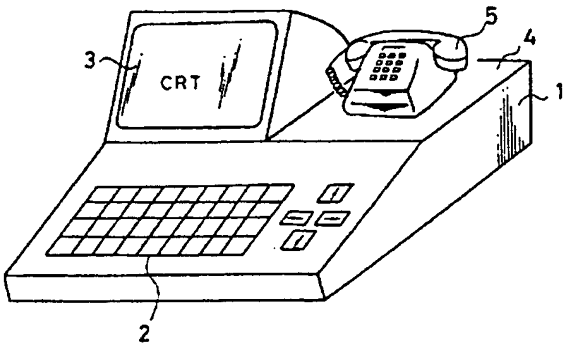

Figure 2

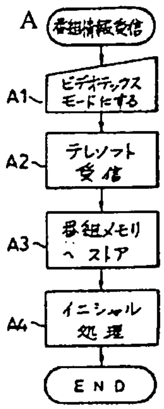
A
番組情報受信
A1
ビデオテックスモードにする
A2
テレソフト受信
A3
番組メモリへストア
A4
イニシャル処理
END

Figure 5

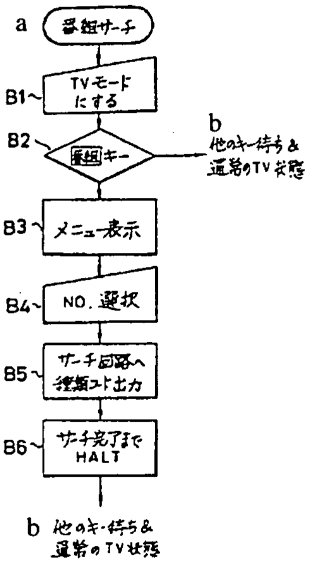
a
番組サーチ
B1
TVモードにする
B2
番組キー
b
他のキー待ち＆通常のTV状態
B3
メニュー表示
B4
NO.選択
B5
サーチ回路へ種類コード出力
B6
サーチ完了までHALT
b
他のキー待ち＆通常のTV状態

Figure 7

[captions]
[Figure 5]
A: Program information reception
A1: Select videotape mode
A2: Telesoft reception
A3: Sore in program memory
A4: Initial processing

[Figure 7]
a: Program search
b: Wait for other keys; normal TV mode
B1: Select TV mode
B2: Program key
B3: Menu display
B4: No. select
B5: Output type code to search circuit
B6: HALT until search completed

16

Date	Channel	Day of week	Start	End	Type	F_1	F_2	Program title
5/12	CH 1	SAT	6:00	6:15	News			
5/12	CH 1	SAT	6:15	6:45	Educational			
5/12	CH 1	SAT	6:45	7:20	News			
5/12	CH 1	SAT	7:20	7:25	Weather forecast			
⋮	⋮	⋮	⋮	⋮	⋮			⋮
5/12	CH 4	SAT	13:00	16:30	Baseball			
⋮	⋮	⋮	⋮	⋮	⋮			⋮
5/12	CH 6	SAT	19:00	19:30	Cartoons			
5/12	CH 6	SAT	19:30	20:00	Quizzes			

Figure 3

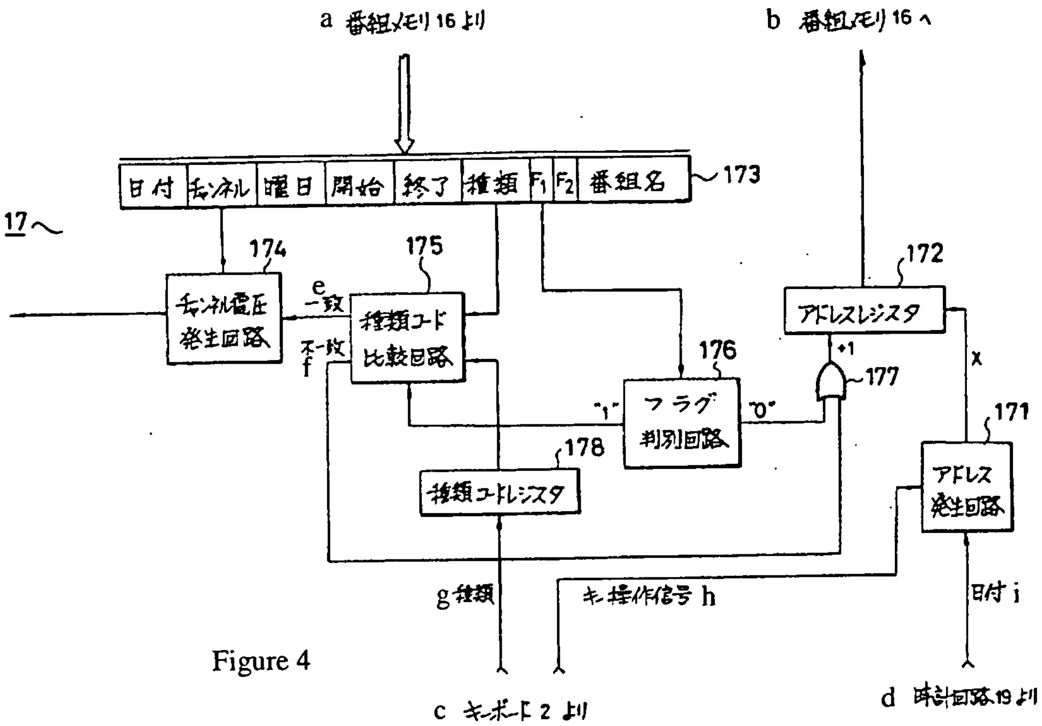
a 番組メモリ16より
b 番組メモリ16へ
日付
チャンネル
曜日
開始
終了
種類
F1
F2
番組名
173
17
174
175
172
アドレスレジスタ
e
一致
不一致
f
チャンネル電圧発生回路
種類コード比較回路
176
フラグ判別回路
"1"
"0"
+1
177
x
171
アドレス発生回路
178
種類コードレジスタ
g 種類
キー操作信号 h
日付 i
c キーボード2より
d 時計回路19より

Figure 4

[captions]
a: From program memory 16
b: To program memory 16
c: From keyboard 2
d: From clock circuit 19
e: Match
f: No match
g: Type
h: Key operation signal
173: Date | Channel | Day of week | Start | End | Type | F_1 | F_2 | Program title

i: Date
171: Address generating circuit
172: Address register
174: Channel voltage generating circuit
175: Type code comparison circuit
176: Flag discrimination circuit
178: Type code register

Program menu

1 News
2 Weather forecast
3 Baseball
4 Sports
5 Films
6 Educational
7 Drama
8 Songs
9 Cartoons
10 Quizzes
11 Tabloid
12 Sketches

Figure 8

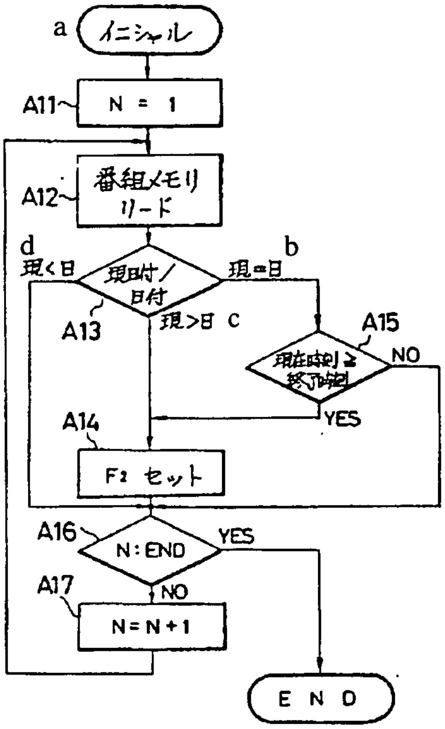
a
イニシャル
A11
N = 1
A12
番組メモリ リード
d
現<日
現日付/日付
A13
b
現=日
現>日 c
A15
現在時刻≧終了時刻
NO
YES
A14
F2 セット
A16
N : END
YES
A17
NO
N = N + 1
END

Figure 6

[captions]
a: Initial
b: Current = date
c: Current > date
d: Current < date
A12: Program memory read
A13: Current date / date
A14: Set F_2
A15: Current time ≥ end time

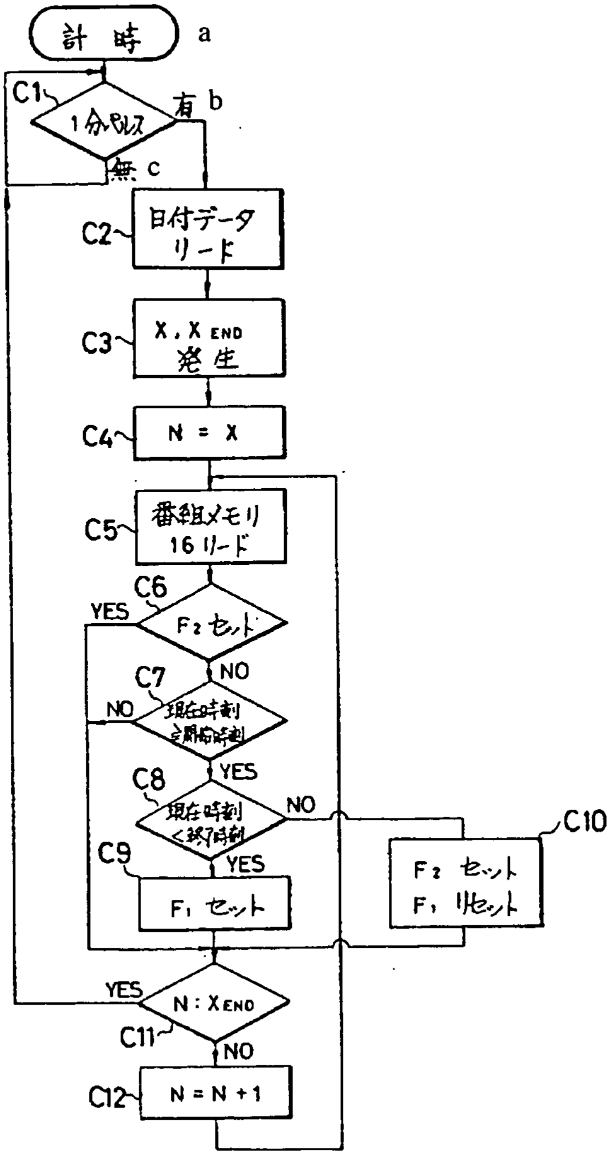
計 時
a
C1
1分パルス
有
b
無
c
C2
日付データ リード
C3
X , X END 発生
C4
N = X
C5
番組メモリ 16 リード
C6
YES
F2 セット
NO
C7
NO
現在時刻 ≧開始時刻
YES
C8
現在時刻 <終了時刻
NO
C9
YES
F1 セット
C10
F2 セット
F1 リセット
YES
N : XEND
C11
NO
C12
N = N + 1

Figure 9

[captions]
a: Time
b: Present
c: Absent
C1: one-minute pulse
C2: Read date data
C3: Generate x, x_{END}
C5: Read program memory 16
C6: Set F_2
C7: Current time ≥ start time
C8: Current time < end time
C9: Set F_1
C10: Set F_2; Reset F_1

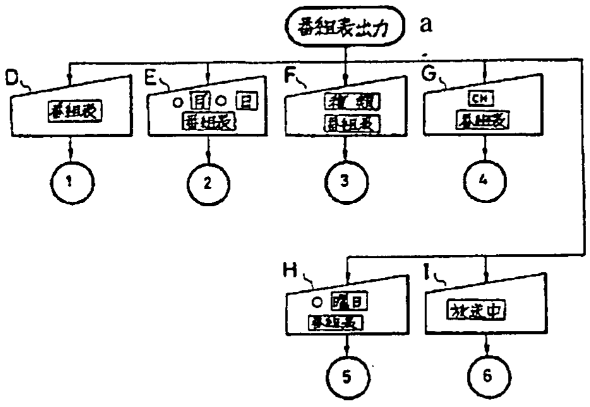
番組表出力
a
D
E
F
G
番組表
○月○日
番組表
種類
番組表
CH
番組表
1
2
3
4
H
I
○曜日
番組表
放送中
5
6

Figure 10

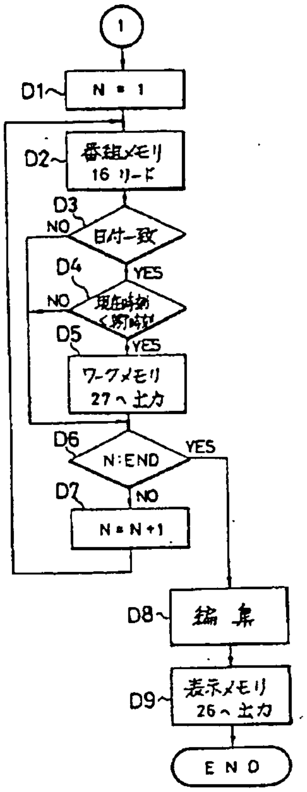
1
D1
N = 1
D2
番組メモリ
16 リード
D3
NO
日付一致
D4
YES
NO
現在時刻
<終了時刻
D5
YES
ワークメモリ
27へ出力
D6
N:END
YES
D7
NO
N = N+1
D8
編集
D9
表示メモリ
26へ出力
END

Figure 11

[captions]

a: Program list output

D: Program list

E: ○ Month ○ Day
Program list

F: Type
Program list

G: CH
Program list

H: ○ Day of week
Program list

I: On air

D2: Read program memory 16
D3: Dates match
D4: Current time < end time
D5: Output to work memory 27
D8: Edit
D9: Output to display memory 26

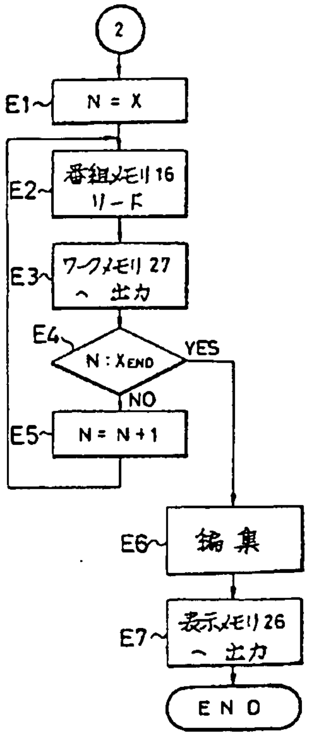
2
E1
N = X
E2
番組メモリ16 リード
E3
ワークメモリ27 へ出力
E4
N : X_{END}
YES
NO
E5
N = N+1
E6
編集
E7
表示メモリ26 へ出力
END

Figure 12

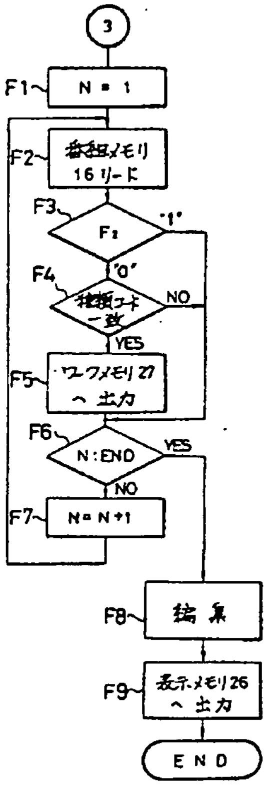
3
F1
N = 1
F2
番組メモリ 16 リード
F3
F_2
"1"
"0"
F4
種類コード 一致
NO
YES
F5
ワークメモリ27 へ出力
F6
N : END
YES
NO
F7
N = N+1
F8
編集
F9
表示メモリ26 へ出力
END

Figure 13

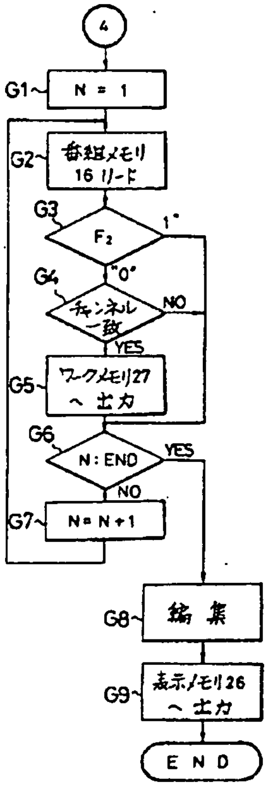
4
G1
N = 1
G2
番組メモリ 16 リード
G3
F_2
"1"
"0"
G4
チャンネル 一致
NO
YES
G5
ワークメモリ27 へ出力
G6
N : END
YES
NO
G7
N = N+1
G8
編集
G9
表示メモリ26 へ出力
END

Figure 14

[captions]
E2: Read program memory 16
E3: Output to work memory 27
E6: Edit
E7: Output to display memory 26

F2: Read program memory 16
F4: Type codes match
F5: Output to work memory 27
F8: Edit
F9: Output to display memory 26

G2: Read program memory 16
G4: Channels match
G5: Output to work memory 27
G8: Edit
G9: Output to display memory 26